**Experimental Design TEST A - KEY**

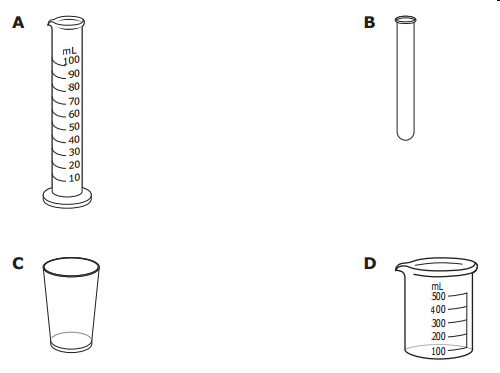
**Multiple Choice**

*Identify the letter of the choice that best completes the statement or answers the question.*

**PROCESS STANDARD 8.1: OBSERVE AND MEASURE – SCIENCE METRICS**

\_A\_\_\_ 1. Which piece of equipment would accurately measure 50 milliliters of

liquid?



|  |  |
| --- | --- |
| A | A |
| B | B |
| C | C |
| D | D |

\_C\_\_\_ 2. Use the metric ruler and line to answer questions 8 and 9.

What is the length of the line in centimeters?

|  |  |
| --- | --- |
| A | 28 cm |
| B | 3 cm |
| C | 2.8 cm |
| D | 2.9 cm |

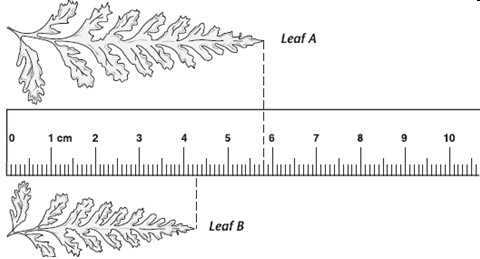
\_A\_\_\_ 3. What is the length of the line in millimeters?

|  |  |
| --- | --- |
| A | 28 mm |
| B | 30 mm |
| C | 2.8 mm |
| D | 2.9 mm |

\_A\_\_\_ 4. The amount of space an object takes up is its

|  |  |
| --- | --- |
| A | volume. |
| B | density. |
| C | mass. |
| D | length. |

\_D\_\_\_ 5. Use the diagram below to answer the question:



How many centimeters longer is Leaf A than Leaf *B?*

|  |  |
| --- | --- |
| A | 4.3 cm |
| B | 4.4 cm |
| C | 1.4 cm |
| D | 1.5 cm |

\_C\_\_ 6. If a shoe box measures 6 cm high, 7 cm wide, and 20 cm long, what is its volume?

|  |  |
| --- | --- |
| A | 420 cm |
| B | 420 cm3 |
| C | 840 cm3 |
| D | 840 cm |

\_B\_\_\_7. The metric system of measurement is based on the number

|  |  |
| --- | --- |
| A | 1. |
| B | 10. |
| C | 12. |
| D | 100. |

\_B\_\_\_ 8. *Use the diagrams to answer the question.*



What is the volume of the rock?

|  |  |  |  |
| --- | --- | --- | --- |
| A | 75 mL | C | 75 cm |
| B | 25 mL | D | 25 cm |

\_B\_\_\_ 9. The basic unit of length in the metric system is the

|  |  |
| --- | --- |
| A | foot. |
| B | meter. |
| C | mile. |
| D | kilometer. |

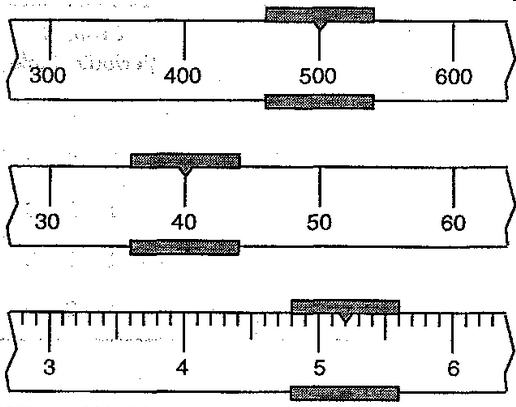
\_B\_\_\_ 10. The gram is the basic metric unit of

|  |  |
| --- | --- |
| A | length. |
| B | mass. |
| C | weight. |
| D | volume. |

\_B\_\_\_ 11. Mass and weight are different because

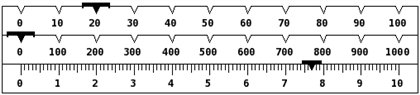
|  |  |
| --- | --- |
| A | mass depends on the force of gravity, weight does not. |
| B | weight depends on the force of gravity, mass does not. |
| C | weight depends on the amount of matter an object contains. |
| D | mass does not depend on the amount of matter an object contains. |

\_D\_\_\_ 12. The diagram below represents a portion of a triple-beam balance. What is the total mass?



|  |  |
| --- | --- |
| A | 50405.2 cm |
| B | 50405.2 kg |
| C | 5452 g |
| D | 545.2 g |

\_A\_\_\_ 13. The diagram below represents a triple-beam balance measurement. What is the total mass?



|  |  |
| --- | --- |
| A | 820 g |
| B | 27.7 g |
| C | 820 km |
| D | 27.7 km |

\_A\_\_\_14. Use the thermometers to answer the question:



What was the increase in temperature from Tuesday to Wednesday?

|  |  |
| --- | --- |
| A | 32 degrees C |
| B | 21 degrees C |
| C | 11 degrees C |
| D | none of the above |

PROCESS STANDARD 8.3.6: RECOGNIZE POTENTIAL HAZARDS & PRACTICE SAFETY PROCEDURES – LAB SAFETY

\_A\_\_\_ 15. These pictures warn of possible dangers in the laboratory and remind you to work carefully.



It is important that students watch for these and other warnings known as:

|  |  |
| --- | --- |
| A | safety symbols |
| B | end-of-experiment rules |
| C | dress code |
| D | precautions |

\_D\_\_\_ 16. The most important lab safety rule is

|  |  |
| --- | --- |
| A | always wear a lab apron. |
| B | always wear safety goggles. |
| C | design and conduct your own experiments without asking your teacher. |
| D | always follow your teacher’s instructions and textbook directions exactly. |

\_B\_\_\_ 17. What is the first thing you should do if an accident occurs?

|  |  |
| --- | --- |
| A | Find the emergency equipment. |
| B | Notify your teacher. |
| C | Go to the nearest hospital. |
| D | Start first aid treatment. |

\_C\_\_\_ 18. Which treatment should be first when acid is spilled on the skin?

|  |  |
| --- | --- |
| A | apply burn ointment |
| B | cool the skin with ice |
| C | rinse the skin with water |
| D | put a bandage on the skin |

\_D\_\_\_ 19 During an experiment, Lindsey decides to mix two chemicals that the lab procedure does not say to mix, because she is curious about what will happen. Which safety rule is being broken?

|  |  |
| --- | --- |
| A | Do not engage in horseplay. |
| B | To protect yourself from injuring your eyes, wear safety goggles whenever you work with chemicals. |
| C | Wear a lab apron or coat whenever you work with corrosive chemicals. |
| D | Never perform activities that are not assigned or authorized by your teacher. |

\_C\_\_\_ 20. The safety equipment locations for the 7th and 8th grade science class are

|  |  |
| --- | --- |
| A | Under the TV and next to the pencil sharpener |
| B | In both closets next to the windows |
| C | In the bottom cabinet under the flag and behind the big window wall |
| D | All of the above |

PROCESS STANDARD 8.3: **EXPERIMENTAL DESIGN**

\_A\_\_\_ 21. Using one or more of your senses to gather information is called

|  |  |
| --- | --- |
| A | observing. |
| B | inferring. |
| C | predicting. |
| D | classifying. |

\_B\_\_\_ 22. Observations that deal with a number or amount are called

|  |  |
| --- | --- |
| A | manipulated observations. |
| B | quantitative observations. |
| C | qualitative observations. |
| D | operational observations. |

\_C\_\_\_ 23. Observations that deal with descriptions that cannot be expressed in numbers are called

|  |  |
| --- | --- |
| A | manipulated observations. |
| B | quantitative observations. |
| C | qualitative observations. |
| D | operational observations. |

\_B\_\_\_ 24. Explaining or interpreting the things you observe based on reasoning from what you already know is called

|  |  |
| --- | --- |
| A | observing. |
| B | inferring. |
| C | predicting. |
| D | classifying. |

\_A\_\_\_ 25. During an experiment, which factors must be kept the same for a fair, unbiased test?

|  |  |
| --- | --- |
| A | controlling variables |
| B | dependent variables |
| C | inquiries |
| D | theories |

\_A\_\_\_ 26. During an experiment, if you purposely change the temperature to test a hypothesis, the temperature is called the

|  |  |
| --- | --- |
| A | independent (manipulated) variable. |
| B | dependent (responding) variable. |
| C | operational variable. |
| D | dependent variable. |

\_B\_\_\_ 27. If you explain the changing colors of the sky with an educated guess or testable prediction, you are proposing a(n)

|  |  |
| --- | --- |
| A | law of nature |
| B | hypothesis |
| C | data interpretation |
| D | weather report |

\_B\_\_\_ 28. In a scientific experiment, the factor that may change in response to the independent (manipulated) variable is called the

|  |  |
| --- | --- |
| A | hypothetical variable. |
| B | dependent variable. |
| C | operational variable. |
| D | independent variable. |

\_C\_\_\_ 29. An organized way to collect and record scientific observations is with a(n)

|  |  |
| --- | --- |
| A | model. |
| B | inference. |
| C | data table. |
| D | operational definition. |

\_C\_\_\_ 30. A summary of what you have learned from a scientific experiment is called a(n)

|  |  |
| --- | --- |
| A | hypothesis. |
| B | inquiry. |
| C | conclusion. |
| D | law. |

\_B\_\_\_ 31. One useful tool that may help a scientist interpret data by revealing unexpected patterns is a

|  |  |
| --- | --- |
| A | variable. |
| B | graph. |
| C | theory. |
| D | law. |

\_C\_\_\_ 32. A student wanted to know if steel wool reacts with air and water.

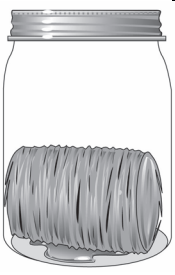
The student did the activity by performing these steps:

1. Placed the steel wool in a clear jar and screwed on the cap

2. Let the jar stand for one full day

3. Recorded the observations

4. Wet the steel wool in some water



In which order should the student have completed the steps listed above?

|  |  |
| --- | --- |
| A | 2, 3, 4, 1 |
| B | 4, 2, 3, 1 |
| C | 4, 1, 2, 3 |
| D | 1, 2, 3, 4 |

\_A\_\_\_ 33. A student wanted to see if two brands of carbonated drink contained the

same amount of dissolved gas. She performed the following steps in her

experiment.

A. Recorded the price of each bottle of soda

B. Opened soda bottles and put empty balloons over the bottle mouths

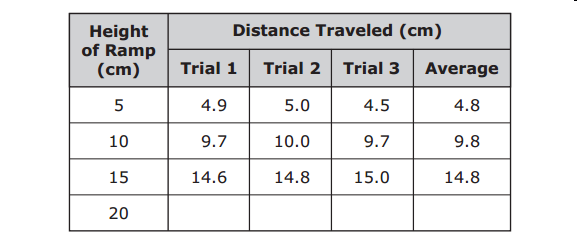
C. Set bottles in a sunny place for 2 hours

D. Compared the size of the full balloons

Which step would not help her find out if the hypothesis is correct?

|  |  |
| --- | --- |
| A | A |
| B | B |
| C | C |
| D | D |

\_C\_\_\_ 34. Mrs. Young’s class experimented with the distance toy cars traveled using different heights of ramps. The class got the following results from their experiment.



If Mrs. Young’s class changed the height of the ramp to 20 cm, what would you expect the three trial distances to be?

|  |  |
| --- | --- |
| A | 15.6 cm, 16.0 cm, 15.4 cm |
| B | 17.7 cm, 17.8 cm, 17.7 cm |
| C | 19.5 cm, 19.9 cm, 20.0 cm |
| D | 21.7 cm, 21.9 cm, 22.0 cm |

**True/False**

***Indicate whether the sentence or statement is true (A) or false (B).***

\_F\_\_\_ 35. A(n) hypothesis is a statement that describes how to measure a particular variable or define a particular term.

\_T\_\_\_ 36. In a scientific experiment, the one variable that is purposely changed to test a hypothesis is called the independent ( manipulated) variable.

\_T\_\_\_ 37. Thinking and questioning is the start of the scientific method process.

**Matching**

Match the following vocabulary words with problems **42-46**:

|  |  |  |  |
| --- | --- | --- | --- |
| A | Independent Variable | D | Qualitative Observation |
| B | Dependent Variable | E | Data |
| C | Controlling Variables |

\_B\_\_\_ 38. What you measure or observe to obtain your results, influenced by the independent variable

\_E\_\_\_ 39. Measurements and other observations

\_A\_\_\_ 40. Factor that is changed in an experiment

\_D\_\_\_ 41. What the person performing the activity sees, hears, feels, smells, or tastes

\_C\_\_\_ 42. Keeping all variables the same except the Independent (manipulated) variable